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Interim Report on the 70 m.p.h. Speed Limit Trial

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INTRODUCTION

At midday on December 22, 1965 a general speed limit of 70 m.p.h. came into operation on all roads in Great Britain (including motorways) which were not already subject to a lower limit. The limit was imposed on motorways under Section 37 of the Road Traffic Act, 1960, and on the formerly unrestricted roads under Section 13 of the Road Traffic Act, 1962. It was to remain in operation for a trial period until the end of April 13, 1966. About one-quarter of all road casualties in Great Britain each year occur on the roads to which the new limit applies.

At the same time a system of warning lights was also installed on motorways by which the police could give advance warning to drivers of fog, accident or other adverse conditions. While the lights were in operation for this purpose drivers were advised but not obliged to reduce speed to 30 m.p.h.

The Road Research Laboratory had been asked to assess the effect of the 70 m.p.h. speed limit. The Laboratory reported to the Minister of Transport in March and April 1966 on such data as were then available. These preliminary findings indicated that, especially in the case of the motorways, a longer period of experience was desirable before firm conclusions about the value of the new limit could be reached. On April 6, 1966 the Minister accordingly announced that the trial would be extended until June 12, 1966. As an additional road safety measure the Minister also decided that heavy goods vehicles and all vehicles drawing trailers would be prohibited from using the outer (right-hand) lane of 3-lane motorways for a trial period of 15 months with effect from May 23, 1966.

In May, 1966 the Road Research Laboratory again reported on the effect of the 70 m.p.h. limit to the Minister, who announced on May 17 that there were signs that the speed limit had helped to reduce accidents, and that, in order to obtain further evidence, the speed limit would remain in force until September 3, 1967. The Minister also undertook to publish early in July 1966 a fuller assessment by the Road Research Laboratory, and the present report is in fulfilment of that undertaking.

The scope of the report

In order to assess the effect of the 70 m.p.h. limit the Laboratory is making separate studies of conditions on motorways and on ordinary roads, including:

(i) measurements of vehicle speeds;
(ii) studies of the numbers of accidents and casualties related to road class, traffic volumes, the weather and other road conditions;
(iii) surveys of the attitudes of drivers to the new speed limit.

This report describes the work that has been carried out so far. No attempt is made to evaluate the benefits of the other new safety measures on motorways already mentioned, but the effects of these changes are taken into account as far as possible when necessary.

After the occurrence of a road accident there is necessarily a time lag of some weeks between the notification to the police and final receipt of the details at the Road Research Laboratory in a suitable form for research purposes. It was necessary to shorten the usual procedures temporarily for this investigation and, by putting aside other work, to concentrate on the main accident analyses given here. Even so, it has not always been possible to carry out each study in the same detail or for the same period, either because of lack of time or because data for the earlier years were unobtainable or not available in time. The exact periods and conditions are specified in the table headings and should be carefully noted when making comparisons.

It should be mentioned here that a simple comparison of accident data for periods before and after the limit came into operation is not sufficient on which to base an assessment of this kind. The basic requirement is to compare the various quantities in which we are interested (e.g. numbers of accidents) with estimates of what they would have been if the limit had not been applied. These estimates are called "expected" values and it is desirable that they should take into account as far as possible the contributions which changes other than the speed limit have made to the overall situation. Methods of analysis have, therefore, had to be developed, and the extent to which they have been applied so far is covered in this report.

SPEED STUDIES

Method

Speeds were measured at five places on straight level sections of road. The locations were as follows:

Motorways

M.1 (dual three-lane). Two miles north of Newport Pagnell Service Area. (Southbound.)

M.4 (dual three-lane). One mile east of Langley (Slough East) Interchange. (Westbound.)

M.4 (dual two-lane). West of Slough Central Interchange. (Eastbound.)

All-purpose roads

A.1 (dual two-lane.) Near Huntingdon. (Northbound.)

A.412 (three-lane). Between Denham and Rickmansworth. (Northbound.)

At the site on M.1 speeds were measured by two radar speedmeters, one on the shoulder measuring the speeds of vehicles in the nearside lane, and one on the central reserve for vehicles using the centre and outer lanes. The observers attempted to measure the speeds of all vehicles, and in practice only about 5 in 1,000 were missed. At the two sites on all-purpose roads, a single radar speedmeter was used, operating from the nearside verge. Here also the observers attempted to measure the speeds of all vehicles and in practice about 5 per cent were missed, mainly due to overtaking vehicles being masked by vehicles nearer the instrument. The results were adjusted for possible underestimation by assuming that the speeds of the missed vehicles had the same distribution as the measured speeds of vehicles in the same lane.

At the two sites on M.4 speeds were measured by means of a pair of pneumatic vehicle detectors connected to an electronic timing device. A 50 per cent sample was taken by measuring the speed of every second vehicle passing the site.

As is usual in such measurements by the Laboratory, every attempt was made to make the presence of the speedmeters and the observers as inconspicuous as possible. In using the radar speedmeter the observer's car was parked on the shoulder or verge to give the impression of being broken-down. The part of the apparatus outside the car was only about the size of a vehicle headlamp and it was mounted close to the back of the car. On M.1, where a second unit was used, it was mounted next to the vehicle guard rail on the central reserve and the cable connecting it to the car was concealed behind an overbridge. When using the detector type of speedmeter the vehicle containing the equipment was parked on an overbridge and well to the side of the road. It is believed that only a negligible proportion of drivers could have been aware that they were being observed; in any event the speeds were measured before the drivers would have had time to slow down. Independent observations from a test vehicle moving along the road confirmed the estimated proportion of vehicles exceeding 70 m.p.h. given by the speedmeter measurements.

To ensure comparability between measurements made before and those made after the introduction of the speed limit the work was confined to fine, clear weather on weekdays. The shortage of good weather during the winter months, in which the main part of the study was made, caused considerable practical difficulties and limited the scope of the measurements.

The " before " measurements were made about the middle of December 1965, the work at each site being spread over two or more days. At each of the five sites, six hours' observations were taken during the hours of daylight (between 10 a.m. and 4 p.m.) and at each of two sites an additional four hours' observations were taken during the hours of darkness (between 7 p.m. and 11 p.m.). The main " after " measurements were carried out between the middle of January and the middle of February 1966, and followed the same pattern as the " before " measurements. They were made, as far as possible, at the same times of day on the same days of the week, but because of interruptions due to bad weather exact correspondence was not always possible.

At the site on M.1 additional measurements were made at the end of December, in mid-March, and in early April; the possibility of further measurements at this site was ruled out because of road works. At the other four sites, one additional set of measurements was made in May or June.

The total duration of all the speed measurements was 116 hours, and, in all, the speeds of about 28,000 vehicles were measured.

Results of speed studies

Table 1 compares the speeds of cars at each of the five sites in mid-December 1965 (before the introduction of the speed limit) with those obtained between mid-January and mid-February 1966, (after the introduction of the speed limit). The Table shows that speeds after the introduction of the speed limit were distinctly lower than before; in most cases the proportion of cars exceeding 70 m.p.h. was reduced by more than one-half. The reduction in the proportion exceeding 80 m.p.h. was even more striking; on M.1, for example, this proportion dropped from 8 to one per cent. Mean speeds were reduced by amounts ranging from 6 to 1½ m.p.h. The standard deviation of speeds (which is a statistical measure of variability) also showed a reduction in all cases, the average reduction being about 15 per cent. This indicates that the range of speeds was narrower after the imposition of the limit. The Table also suggests that the effect of the speed limit may have been smaller in darkness than in daylight, but since night-time measurements were taken at only two sites it is doubtful whether this indication can be regarded as conclusive.

Further information about the results in Table 1 are given in Table 2, which shows that the number of cars whose speeds were measured was generally between about 1,000 and 2,000 in each half of the study at each site. Table 2 also shows that traffic flows during the " after " measurements were somewhat lower than during the " before " measurements. The reduction, which is attributable to a normal seasonal decline, would be expected to have a negligible effect on the speed of traffic.

Table 1 gives the percentages of cars exceeding 70 and 80 m.p.h., but for some purposes more detailed information about the distribution of the speeds of individual vehicles may be required. This is given in Table 3, which refers to the combined distribution for the three motorway sites. It shows that, following the introduction of the speed limit, the percentages of speeds in the speed groups above 70 m.p.h. were all reduced, while those in the speed groups below 70 m.p.h. increased. It has been suggested that the introduction of the speed limit might cause the slower vehicles to " drive up to the limit ". If this were so, it would be expected that the proportion of vehicles in the lower speed groups below, say, 60 m.p.h. would have been reduced, but Table 3 shows that the proportions in these groups have, in fact, increased. It would appear, therefore, that the increase in the proportion of vehicles between 60 and 70 m.p.h. is attributable to vehicles which previously exceeded 70 m.p.h. and that there is no evidence of any upward movement in the speeds of the slower vehicles. An alternative method of representing the distribution of speeds is by cumulative frequency diagrams and these are shown in Fig. 1. The shift of the curve to the left indicates that there has been a general slowing down in the traffic; the speed reductions ranged from about 13 m.p.h. for cars which previously travelled at 90 m.p.h. down to about 1 m.p.h. for cars which previously travelled at 50 m.p.h.

Conditions in the outer lane on 3-lane motorways are of particular interest and the results for M.1 are given in Table 4. The main conclusion from Table 4 is that the introduction of the speed limit was accompanied by a reduction in mean speed in the third lane from 73 to 67 m.p.h., and a reduction in the proportion exceeding 70 m.p.h. from 61 to 31 per cent. The proportion exceeding 90 m.p.h. was reduced from 6½ per cent in the " before " study to zero in the " after " study.

The information in Tables 1–4 and Fig. 1 relates only to the speeds of cars, but similar analyses for goods vehicles showed that, before the introduction of the

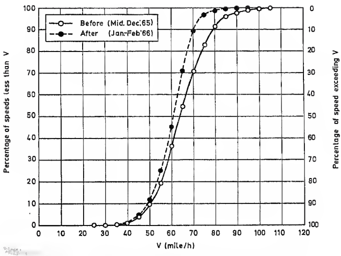

Fig. 1. Cumulative frequency distribution diagrams of the speeds of cars (averaged over three sites on motorways)

speed limit, very few goods vehicles exceeded 60 m.p.h. and practically none exceeded 70 m.p.h. The introduction of the speed limit was accompanied by some reduction in the speeds of goods vehicles but the changes were much smaller and less regular than those for cars. An example of such results is given in Table 5, which refers to M.1.

The "after" results considered up to now refer to measurements taken between mid-January and mid-February 1966, i.e. roughly one month after the introduction of the speed limit. Information is also available about speeds on M.1 on three other occasions since the speed limit was introduced, and this is summarised in Table 6. It shows that speeds were lowest at the end of December, about a week after the speed limit was introduced. Since then, speeds have tended to rise again, but the trend has not been completely regular, possibly due to road works in advance of the observation site in early April. Despite this increase, the highest speeds recorded since the introduction of the speed limit (i.e. those in mid-March) were still lower than before; the proportion exceeding 70 m.p.h. was about two-thirds of that in mid-December, and the proportion exceeding 80 m.p.h. about one quarter of that in mid-December. The corresponding figures for early February were two-fifths and one eighth.

Consideration must be given to the possibility that the changes in speed shown in Table 6 might have occurred even if the 70 m.p.h. limit had not been introduced. Ideally, the results in Table 6 should be adjusted for seasonal variation, but there is a shortage of reliable information on which to base such adjustment. Limited information for another site on M.1 in earlier years(1) showed much smaller variations in mean speed from month to month than those given in Table 2. It would therefore appear that the reduction in speed following the introduction of the speed limit, and the subsequent upward trend, must be regarded as real.

At each of the four sites on roads other than M.1, one additional set of speed measurements was made since the main "after" study in January and February, 1966. The results obtained, which are compared in Table 7 with those of the earlier measurements, show that speeds in the latest measurements (May and June) were greater than in January and February but they were still generally lower than before the introduction of the speed limit.

Bunching

Various definitions of the concept of "bunching" appear to be in use but in this report it is taken to mean several vehicles following unnecessarily or dangerously closely behind one another in the outer (right-hand) lane of a motorway. Such bunching occurred before the speed limit was introduced, particularly on the busier motorways. As the flow of traffic increases the average distance between successive vehicles must decrease, so that the proportion of vehicles following each other closely must be expected to increase. The tendency to bunch is to a large extent related to the traffic flow, and it is therefore relevant to examine whether the speed limit affected the amount of traffic using the outer lane.

During the speed measurements on M.1 information was obtained about the proportion of all cars which travelled in the outer lane, and the results are summarised in Table 8. This indicates that the introduction of the speed limit caused a reduction in the proportion of cars travelling in the third lane.

The reduction in the use of the third lane might, in itself, reduce the tendency to bunch in that lane, but this is not the full story. It has been demonstrated that the introduction of the speed limit was accompanied by a reduction in the range of speeds (see Table 1) and this might be conducive to the formation of bunches. It is now extremely difficult, if not impossible, to check whether bunching has in fact increased because there is practically no information about the separation between vehicles before the introduction of the limit. The only available information refers to less than one hour's observations of intervals between vehicles on the third lane of M.4 in December 1965, and comparison with similar measurements after the introduction of the speed limit suggested that the tendency for vehicles to travel close together has increased. However, results based on such a small amount of data are unlikely to be representative, and the comparison must be regarded as inconclusive. Nevertheless, it is quite plausible that the net effect of the 70 m.p.h. limit may have been to cause vehicles to travel closer in the third lane.

Even if bunching has increased this must not be judged out of context and should be considered in conjunction with the overall effect of the 70 m.p.h. speed limit on accidents; this is done in the next section.

The practice of vehicles travelling behind one another at the same speed is not dangerous as long as they do not bunch. In the motorway section of the Highway Code drivers are urged "to allow ample distance between your vehicle and the one ahead according to speed."

Another concept of bunching which has been adopted in some quarters is that of groups of vehicles travelling abreast in different lanes at about the same speed. This matter has not been studied but it might be expected that the speed limit has increased the frequency of such occurrences.

Summarising this section on speed studies, it is apparent that the introduction of the speed limit was followed by a considerable reduction in the proportion of vehicles exceeding 70 m.p.h. and by a striking reduction in the proportion exceeding 80 m.p.h; speeds have tended to increase since the speed limit was introduced, but in the latest result they remained lower than before the introduction. Finally, information obtained at one site on a three-lane motorway shows a reduction in the use of the third lane after the introduction of the limit, but there is no satisfactory evidence to indicate whether bunching has increased.

ACCIDENTS AND CASUALTIES ON ORDINARY ROADS

Conditions on the roads are continually changing in both the short and the long term: for example, a mild, sunny Sunday in early spring may bring on to country roads many cars which would not have left their garages if the day had been cold and wet. Again, in the longer term, the number of vehicles on the roads is increasing, and the proportion of two-wheeled vehicles is decreasing, from year to year.

Direct comparison of casualty and accident figures for the 70 m.p.h. speed limit trial period with the figures for corresponding periods of earlier years can give some indication of the effect of the limit if that effect is large enough. However, to distinguish between the effect of the limit and those of other changes in conditions on the roads it is necessary to compare the figures for the trial period with reliable estimates of the numbers that would have occurred if the limit had not been in force. As part of this investigation the Laboratory is trying to develop reliable methods of making such estimates for ordinary roads, on which the numbers of accidents are large enough to offer a reasonable prospect of success. A satisfactory method has not yet been found but work is continuing, and progress so far may be summarized as follows.

In assessing the effect of the 70 m.p.h. speed limit the Laboratory undertook to allow as far as possible for the effects of weather on the accident rate. The first step was to divide the numbers of fatal and serious casualties by estimated vehicle-mileages to obtain casualty rates for the various classes of road, thus allowing for a large part of the variation arising from changes in the number of vehicles on those roads. Attempts were then made by regression analysis to explain variations in these casualty rates in terms of weather conditions and traffic composition. If this could be done, casualty rates that would have been expected in 1966 if the limit had not been in force could be estimated from known weather conditions and traffic composition at that time. The first method to be tried used Meteorological Office weather data; the second used the reported road surface conditions at accident sites as a measure of weather conditions; and the third was an extension of the second, taking account of the proportion of two-wheeled vehicles in the traffic and making further allowances for the total amount of traffic. The reasons for this choice of methods, and for rejecting the first two, are discussed in the Appendix. At the time of writing, assessment of the third method is still in progress and it is too early to say whether it can be accepted.

In view of the above, this part of the report will be restricted to comments on trends in the actual accident and casualty rates, no reliable allowance being possible at present for the effects which weather and certain other factors may have had on them over the years. It is hoped to publish a further report on this aspect of the work before the end of the experimental period in September 1967.

On dual carriageway roads higher speeds are possible than on ordinary 2-way roads, and the effect of the speed limit on them is of particular interest. In the time available, however, it has not been practicable to assemble all the data necessary for examining trends in accident frequency on them separately, as their mileage, although relatively small, has increased considerably within the 7 years being studied. Furthermore, estimates of vehicle-mileage from the limited data now available for past years would be less accurate for dual carriageways (because based on fewer traffic sampling sites) than for all roads and the estimated accident rates on them therefore subject to greater statistical errors.

Neither has it been possible in the time available to eliminate from the accident data for the 7 years all those occurring on the lengths of main rural road (totalling some 400 miles) which became subject to a speed limit of 50 m.p.h. during the summer of 1965. Statements on the effect of the speed limit on roads previously unrestricted will therefore contain the effects of the present 50 m.p.h. limit. The data will eventually be modified to do this as far as possible. Although earlier work has shown that a week-end 50 m.p.h. limit was beneficial on the roads concerned(²), the effect on the accident rate of the present 50 m.p.h. limit on all the roads of any one class is likely to be small, as the following argument shows.

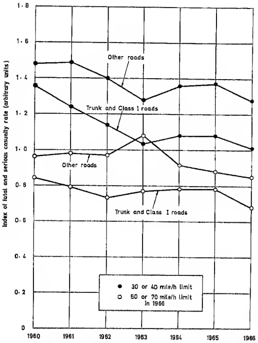

Fig. 2. Indices of fatal and serious casualty rates in Great Britain (excluding motorways)—January to March inclusive

In 1961–64 casualties at week-ends on roads subject to the week-end 50 m.p.h. speed limit were 24 per cent lower than in 1959, when these roads were unrestricted.(2). Figures for similar roads not subject to the week-end limits suggest that only about one quarter of this reduction could be attributed to the limit. It is therefore unlikely that the present 50 m.p.h. limit, imposed in 1965, has reduced the number of casualties on the roads where it applied by as much as 25 per cent. Of the casualties in the first three months of 1966 on Trunk and Class I roads formerly unrestricted, about 7 per cent occurred on roads subject to the 50 m.p.h. limit. Thus, even if this limit had produced a reduction of 25 per cent, the consequent reduction in casualties on all Trunk and Class I roads subject in 1966 to 50 or 70 m.p.h. speed limits would have been only about 2 per cent.

Monthly totals of casualties in Great Britain for January, February and March 1966 and for the corresponding months of the six preceding years are given in Tables 9 and 10.

Indices of casualties per million vehicle-miles (see footnote to Table 11) derived from Tables 9 and 10 and the results of the Laboratory's permanent 50-point traffic census are given in Tables 11 and 12.

The indices of casualty rate are shown graphically in Figs. 2 and 3. They indicate that the casualty rates have on the whole been falling during the past six years, partly because the proportion of the traffic consisting of 2-wheeled vehicles, which have high accident rates, has been falling in these years. During the 70 m.p.h. speed limit trial period in 1966 these reductions were continued and showed the highest percentage reduction on rural Trunk and Class I roads, where the effect of the 70 m.p.h. limit would be expected to be greatest.

In the first three months of 1966 compared with the same months of 1965 the fatal and serious casualty rate on rural Trunk and Class I roads fell by 13 per cent compared with reductions of 3 to 10 per cent on the other classes of road, thus indicating a possible benefit owing to the speed limit on the rural roads. There are also some indications of a fall in this casualty rate on the urban roads even allowing for trends, which is not yet fully explained but could be due to weather. As already mentioned, a completely satisfactory allowance for the effects of weather has not yet been developed. On the average, however, all types of road would experience the same kinds of weather, so that these comparisons of changes in the casualty rates on the different classes of road automatically make some allowance for the effects of weather.

An analysis of total casualties, and of those to car drivers only, was made to see whether fatal and serious casualties, as a proportion of the total had changed during the speed limit trial. The results are given in Tables 13 and 14. These tables show that the average severity of casualties measured in this way was not markedly different from that in the previous years. On Trunk and Class I roads with 50 or 70 m.p.h. limits in 1966, on which high speeds are more likely, there has been a very slight tendency for the severity of driver casualties and of all casualties to increase over the years but no such increases occurred between 1965 and 1966. There were some slight increases on other classes of road.

Another analysis, given in Table 15, was made to see whether multiple vehicle accidents (those involving three or more vehicles) formed a different proportion of the total during the trial period. The table shows that on the

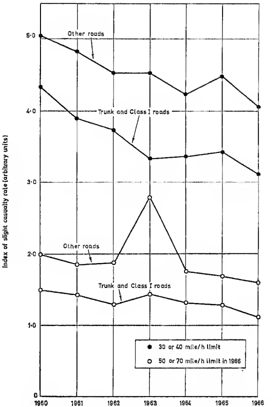

Fig. 3. Indices of slight casualty rates in Great Britain (excluding motorways)—January to March inclusive

Trunk and Class I roads to which the limit applied, and in most other cases, these accidents were relatively fewer. However, although multiple vehicle accidents formed a lower proportion of all accidents on roads with the 70 m.p.h. limit in 1966 than in the 3 preceding years it is not possible at this stage to say whether any of this reduction was due to the imposition of the limit.

ACCIDENTS AND CASUALTIES ON MOTORWAYS

Before giving accident and casualty data for motorways during the 70 m.p.h. speed limit trial it is necessary to mention certain features relevant to their interpretation.

The mileage of motorway in use in Great Britain has increased from 8 in December 1958 to 383 in mid-April 1966, and statements about accident frequency on them must be qualified by the length of road, the amount of traffic and the period covered.

Not only is the mileage of motorway available for study small but the risk of accident on motorways is much lower (less than one-half) than that on ordinary rural main roads. This means that the number of motorway accidents and casualties available for study, even over several years, is relatively small and often inadequate for the detailed studies necessary to reach firm conclusions.

The vehicle-mileage travelled on ordinary roads is known fairly well from the automatic traffic counter records maintained since 1956 by the Laboratory at a random sample of road sites. The Laboratory has also recorded traffic flows on the original 73-mile length of the London-Birmingham motorway (M.1/M.10/M.45) since it was opened in November 1959, and on M.4 and its extensions since June 1961. Traffic records for other motorways, however, are less comprehensive and the vehicle-mileages derived from them cover shorter periods and may sometimes be less reliable. It has already been explained in the section dealing with ordinary roads that although the work on developing methods for estimating expected numbers of casualties during the speed limit trial period is progressing, it is not yet sufficiently advanced for reliable estimates to be made. The same difficulties apply at present to the interpretation of the motorway accident and casualty data, with the added difficulty that the numbers of accidents on motorways are small and the amount of statistical data extremely limited. No allowance can therefore be made in this report for the overall effect of weather on accident rates on motorways but there is one weather condition whose effect can be excluded in some of the analyses.

As mentioned in the Introduction, an advisory speed limit of 30 m.p.h. combined with a system of flashing warning lights was introduced on motorways at the same time as the 70 m.p.h. speed limit. The main reason for these measures was to reduce accidents in fog, although they are used to give warning of other risks as well. To eliminate their effect as far as fog is concerned, accidents in fog and the estimated vehicle-mileage travelled in fog have therefore been omitted from the motorway tabulations wherever possible. This has been indicated in the table headings where necessary.

Sufficient information about the traffic on the whole motorway network is available to enable the injury-accident and casualty rates per mile travelled on them during the months January to March 1966 inclusive, when the 70 m.p.h. limit was in operation, to be compared with the corresponding rates for the same months of 1964 and 1965. These results are shown in Table 16 in the form of relative accident rates, the data being sufficiently accurate to indicate trends but not to give absolute values. No correction has been made to these figures to allow for fog as the necessary information was only available for M.1/M.10/M.45.

Table 16 shows that on M.1 and M.6 separately, and on all the others taken together, the injury accident rate and the casualty rate per mile travelled were lower in the 1965 period, and still lower in 1966, than in 1964 in spite of considerable increases in the volume of traffic carried on motorways.

The Slough and Maidenhead By-passes, constituting 11½ miles of M.4, have been in use long enough to permit a more detailed comparison to be made. This is given in Table 17. Part (i) of the table gives the numbers of accidents and casualties in fog and not in fog during the original trial period (December 22 to April 13) and corresponding periods in earlier winters, while part (ii) relates those not in fog to the traffic not in fog. The second part of the table shows that in the winter of 1964–65 the numbers per million vehicle-miles were higher than in the corresponding period of 1963–64 but in the same period of 1965–66, the 70 m.p.h. trial period, the casualty rate was lower than in the previous winter and the accident rate lower than in either of the two previous winters. Compared with the averages for the two previous periods, between which the rates increased, the casualty rate was 11 per cent higher, the injury accident rate 22 per cent lower, and the total accident rate 46 per cent lower during the trial period. The reductions in the non-injury rate (65 per cent) and in the total accident rate (46 per cent) were both statistically significant at the 1 per cent level.*

In the case of M.1/M.10/M.45 it was possible to extend the data beyond the end of the original trial period (April 13, 1965) to include the whole of April 1965. Table 18 gives the numbers of accidents and casualties on this length of motorway for this period and for the corresponding periods of the 5 previous years and Table 19 relates these figures to the vehicle-miles travelled. This table shows that the injury and non-injury accident rates, and the casualty rate, on M.1 were all lower during the trial of the 70 m.p.h. speed limit than the average for the 5 previous periods. The reductions in the injury accident rate (23 per cent) and in the total accident rate (17 per cent) were both statistically significant.

Fig. 4 shows the main results for M.1 in graph form. It will be seen that neither the injury accident rate nor the total accident rate not in fog showed any marked trend up to 1965 and that the values for the speed limit trial period are the lowest recorded for this motorway.

Table 20 shows for the same length of M.1 the numbers of casualties not in fog according to severity of injury. It shows that the numbers killed or seriously injured as a proportion of the total casualties varied between 38 per cent and 57 per cent between 1960 and 1965 and that the value during the trial period (53 per cent) fell within this range.

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* Apparent reductions in the accident rate (or increases) would always occur even if there were no *real* change in the long run. A reduction is regarded as statistically significant at the 1 per cent level if the chance of such a reduction, or a larger one, is less than 1 per cent, calculated on the hypothesis of no real change.

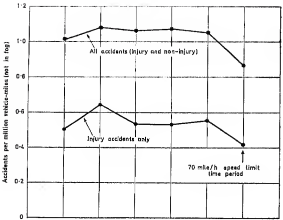

Fig. 4. Accidents per million vehicle-miles on 73 miles of M1/M10/M45 not in fog—December 22 (noon) to April 30 inclusive

An analysis was made of the numbers of accidents (injury and non-injury) on M.1 not in fog in which a vehicle was hit in the rear by another. The results are given in Table 21. Some of the vehicles struck were stationary and these are shown separately (cols. 1 and 2 of the table). The main category, however, consists of accidents in which a moving vehicle was struck by another. The figures in col. 3 were related to the appropriate vehicle-mileages and a relative accident rate derived (col. 5). This shows that the rate of this kind of accident was greater in the first quarter of 1965 than in earlier years but that in 1966, the trial period, the rate fell to the lowest level previously recorded. There is therefore no evidence from the table to suggest that rear-end collisions, which might be associated with " bunching " of vehicles, were more likely while the 70 m.p.h. limit was in operation.

The risk of tyre failure is higher on motorways than on ordinary roads, probably because higher speeds are maintained for longer periods and extra heat is developed in the tyres. If speeds were reduced accidents caused by tyre failures would therefore be expected to diminish. An analysis of such accidents on M.1 during four months was made to discover whether any such effect occurred, the results being given in Table 22. The table shows that the risk of tyre failure accidents on M.1 was highest in 1960 and almost constant during the most recent years 1963–65, but that during the speed limit trial period in 1966 the risk was the lowest recorded.

As the road's resistance to skidding is less at high speeds than at low speeds a reduction in skidding would also be expected if speeds were reduced. Accidents on M.1 were therefore analysed to see whether there was any change in the proportion in which skidding occurred. The results are given in Table 23 and shown in Fig. 5. The percentage of accidents involving skidding was markedly lower on dry roads and on icy roads during the trial period. Part of this effect on icy roads may well be due to the use of the new warning light system. On wet roads there was no obvious change in the percentage involving skidding.

These motorway accident studies therefore show that there are indications of a beneficial effect on the accident rate on motorways of the order of 15 to 20 per cent. Subsidiary studies show that there have been no increases in the severity of casualties, in the proportion of multiple-vehicle accidents, in the proportion of accidents involving skidding, not in the risk of accident due to tyre failure.

MOTORISTS' VIEWS ON THE 70 M.P.H. SPEED LIMIT

The following studies were undertaken to find out how many motorists would be affected by the 70 m.p.h. speed limit, to see how motorists in general felt about it and to see if their views changed after experience of it.

Two postal surveys among motorists were carried out by the Road Research Laboratory and three surveys involving personal interviews were carried out by National Opinion Polls Ltd. Random sampling methods were used to select the people who were approached in all five of these enquiries and response rates of 80 per cent or more were obtained. The smallest of the enquiries involved 347 motorists and in each survey those chosen came from all over England and

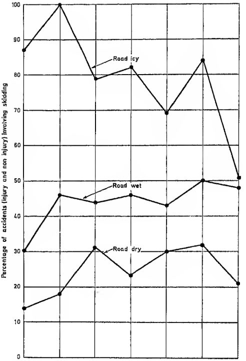

Fig. 5. Percentage of all accidents (injury and non-injury) involving skidding on 73 miles of M1/M10/M45—January to April inclusive

Wales. In view of this it is fair to regard the replies obtained in these enquiries as reflecting those of the general population. The numbers concerned are sufficiently large to make it unlikely that the estimates differ from the true level of opinion by ±7 per cent even in the smallest sample.

Two reservations have to be made: in each survey the electoral roll was used as the sampling frame, so that those who are under 21 years of age were not included; in the Road Research Laboratory surveys, motorists were defined as those who said "yes" when asked "do you drive?", but in the National Opinion Poll surveys only those who have a car at home and who buy the most petrol for it were counted as "motorists".

The extent to which motorists are affected

The first Road Research Laboratory survey was sent out in December 1965 before the speed limit came into force. At that time, 40 per cent of the 353 motorists who replied said that, apart from holiday times, they never drove a vehicle which could go at more than 70 m.p.h., 9 per cent said that they did so on 2 days a week or less, 11 per cent that they did so on 3 or 4 days a week, and 37 per cent that they did so on 5 days a week or more (3 per cent did not reply to this question).

Those who do not use roads where it is possible to drive at more than 70 m.p.h. would also not be personally affected by the 70 m.p.h. speed limit. At that time 24 per cent of the motorists never drove on a motorway, 51 per cent did so less than once a month, 14 per cent between once a month and once a week, and 10 per cent more often than once a week. When asked how often they drove on roads, other than motorways, where people drive at speeds over 70 m.p.h., 10 per cent of these motorists said that they never did so, 20 per cent that they did so less than once a month, 30 per cent between once a month and once a week, and 35 per cent that they did so more than once a week.

Overall, 56 per cent of motorists were affected by this speed limit in that they sometimes drove vehicles which can go at over 70 m.p.h. and in that they also sometimes used a motorway and/or other type of road where, at that time, people drove at speeds of over 70 m.p.h.

Views on the 70 m.p.h. limit

Motorists were asked whether they thought there would be as many accidents with the 70 m.p.h. limit in operation as before and to say if, when accidents happened, they would on the whole be as serious as before the limit was introduced. Table 24 shows results from the Road Research Laboratory survey in December 1965, before the limit was introduced, and from the second survey in February 1966.

Almost half of these motorists felt that the number of accidents, and the seriousness of those which occurred, would be unaffected by the introduction of the 70 m.p.h. limit, and their views on this did not change from the first occasion to the second. No official data on the effect on accidents had been released by the time of the second enquiry. Table 24 suggests that there is a tendency for those who drive a fast vehicle to be more likely than other drivers to believe that there will be no effect on accidents but the differences between the two are not statistically significant.

Motorists will take other factors into account when assessing the merits of the 70 m.p.h. limit. An overall opinion on the speed limit was sought and in the December Road Research Laboratory enquiry motorists were asked "on the whole, do you think that it is a good thing to have such a trial speed limit, or not?": 78 per cent of motorists replied that it was a good thing. The replies varied with the relevance to the motorists. Thus those who sometimes drive on motorways and those who sometimes drive a vehicle which can go at over 70 m.p.h. were significantly less likely to say that they approved of the limit. The later Road Research Laboratory survey showed a trend towards a more favourable response, almost statistically significant at the 5 per cent level when all drivers are considered, the percentage saying the limit is a good thing being 84 per cent in the later survey. The change of opinion was mainly among those most affected by the limit, suggesting that it is experience of it which had changed drivers' views, rather than just a tendency for all motorists to get used to the idea.

A subsidiary question asked only in the second Road Research Laboratory enquiry showed that 10 per cent of motorists thought that a speed higher than 70 m.p.h. should have been chosen and that 26 per cent thought that a lower speed should have been chosen. Most of those who felt that a lower speed should have been chosen nevertheless said that the 70 m.p.h. limit was a good thing.

The National Opinion Poll surveys show a rather different picture. The December 1965 National Opinion Poll enquiry showed 60 per cent of motorists approving of the speed limit, when asked " do you approve or disapprove of the 70 m.p.h. speed limit on all roads ?" This is considerably less than the result from the Road Research Laboratory survey at that time (78 per cent) and the difference is statistically highly significant. The National Opinion Poll survey in February 1966 did not include an exactly comparable question, but it showed 53 per cent of motorists approving of the speed limit on motorways and 68 per cent approving of the speed limit on roads other than motorways. These are also lower than the result of the second Road Research Laboratory survey (84 per cent), but they provide no evidence of a trend for more to be in favour of the limit than was the case in December 1965. However, a further National Opinion Poll enquiry among electors in April 1966 showed that when asked whether the Minister was right or wrong to continue the 70 m.p.h. limit on all roads, 59 per cent thought that the Minister was right, whereas only 53 per cent of electors had said they approved of the 70 m.p.h. speed limit on all roads when a question on this was put to electors in the the previous December. The views of motorists cannot be analysed separately for the April enquiry and of course the two questions were rather different. Nevertheless this April enquiry offers some support for the hypothesis that there is a trend for motorists to become more tolerant of the limit with time.

There are some differences between the methods used in the National Opinion Poll and Road Research Laboratory surveys which might help to explain the differences between the two sets of results. The Road Research Laboratory questionnaires were sent out with a letter bearing a Ministry of Transport address and they also referred to ' a trial speed limit ': this could have led to greater tolerance being shown. The other difference arises from the definitions used of ' a motorist ': the National Opinion Poll definition would exclude those who drive vans, lorries or motorcycles if they do not have a car at home and it may be that this leads to an unusually high proportion in the National Opinion Poll sample of those driving vehicles which can go at over 70 m.p.h. Those who buy most of the petrol will probably use fast roads more than other drivers. The Road Research Laboratory survey showed that such people were particularly likely to disapprove of the 70 m.p.h. speed limit.

In the opinion of the Road Research Laboratory the definition of a motorist as a person who says " yes " when asked " do you drive " is more appropriate for an enquiry on this topic than the National Opinion Poll's definition: however, it seems unlikely that the whole of the difference between the results of the National Opinion Poll and Road Research Laboratory enquiries as to how many approved of the 70 m.p.h. limit can be explained in these terms. The form of question used and the knowledge of who was sponsoring the enquiry probably also influenced the replies.

Only the views of motorists have been considered here. It could be argued that it is more important to consider the views of the population as a whole, or the views of the motorists who are most affected. The first National Opinion Poll survey showed that those who are not motorists are somewhat less in favour of the new speed limit than motorists are, though this difference is not statistically significant: in the second survey there was no difference in relation to motorways, but non-motorists were significantly less likely to approve of the limit for other roads. The Road Research Laboratory show that those motorists who are most affected by the limit were less in favour of it than other motorists before the limit was introduced, but that their views appeared to become more favourable with time, until they were no different from those of other motorists. These data are shown in Table 25.

Summing up, these surveys have shown that the 70 m.p.h. speed limit could apply directly to about one half of all motorists. They also show that however motorists were defined and however the questions were phrased, more than half of all motorists were in favour of the 70 m.p.h. speed limit both on motorways and on ordinary roads. However, it is probably fair to infer that approximately three-quarters of motorists were in favour of the limit; of these motorists more favoured it for ordinary roads than favoured it for motorways. There are indications, too, that there was a trend for motorists to become more in favour of the speed limit as they gained experience of it.

POLICE REPORTS

The 70 m.p.h. limit on motorways

The 18 police forces responsible for patrolling motorways were invited to submit monthly reports to the Laboratory giving their views on the operation of the 30 m.p.h. warning system and of the 70 m.p.h. speed limit. For the period up to April 13, 1966, 17 of the forces submitted 4 reports each and one submitted 3 reports. Separate comments were given for 2-lane and 3-lane motorways. The experience on all motorways for the whole of the original period of the trial is therefore covered by these reports.

A summary of the 18 forces' comments on the operation of the 70 m.p.h. limit is given in Table 26. At the time of writing many of the 18 forces had submitted further reports up to June 13, 1966. As these returns are not yet complete they have not been included in Table 26 but so far they do not suggest that any major modifications to the views expressed in the table will be necessary.

CONCLUSIONS

1. Shortly after the introduction of the 70 m.p.h. speed limit the numbers of cars exceeding 70 m.p.h. fell by 55 per cent, and those exceeding 80 m.p.h. fell by 75 per cent, at the five sites studied.

2. Speeds have tended to increase since the limit was introduced but they still are lower than before the introduction.

3. The introduction of the limit was also accompanied by small reductions in the speeds of goods vehicles.

4. Casualties per million vehicle-miles on all classes of road other than motorways have been generally falling in recent years. During the first three months of 1966 the reduction in the fatal and serious casualty rate on Trunk and Class I roads with 50 or 70 m.p.h. speed limits was 13 per cent compared with the same months of 1965; on other classes of road the reductions were between 3 and 7 per cent. The slight casualty rate changed in much the same way.

5. On ordinary roads during the first three months of 1966 fatal and serious casualties to all road users formed about the same proportion of the total casualties as in the corresponding months of previous years; the same was true for car drivers alone. On Trunk and Class I roads now subject to 50 or 70 m.p.h. limits these proportions have been tending to rise but no further increases occurred on them between 1965 and 1966.

6. On ordinary roads during the first three months of 1966 the proportion of accidents involving three or more vehicles was slightly less than in recent years.

7. On motorways as a whole the injury accident rate and the casualty rate (including those in fog) in the period January to March inclusive fell between 1965 and 1966, as they had done between 1964 and 1965.

8. On M.1 and M.4 there were statistically significant reductions of about 20 per cent in the injury accident rate during the trial period compared with corresponding periods of earlier years. On M.1 there was a reduction of 13 per cent in the casualty rate but on M.4 there was an increase of 11 per cent.

9. Other studies of accidents on M.1/M.10/M.45 showed that during the trial period there was no change in the proportion of casualties not in fog that were fatal or serious; that the head-to-tail accident rate not in fog, which had been increasing, fell to its previous lowest value; that the number of accidents per million vehicle-miles apparently caused by tyre failures was lower than in any of the previous 6 years; and that the percentage of accidents involving skidding decreased.

10. There appears to have been no significant increase in the proportion of head-to-tail accidents on M.1 since the introduction of the 70 m.p.h. speed limit; such an increase might have been expected if " bunching " had increased to

a dangerous extent. Police reports suggest that there has been some increase in bunching at a few places but, because of the lack of information about driver behaviour on motorways before the limit was introduced, it has not been possible to confirm this.

11. Surveys showed that more than half of all motorists were in favour of the 70 m.p.h. limit both on motorways and on ordinary roads.

12. There are indications that motorists tended to become more in favour of the limit as they gained experience of it.

13. In the opinion of police traffic officers in the 18 forces responsible for patrolling motorways, the 70 m.p.h. limit has been reasonably well observed.

14. *General conclusion.* From studies of many aspects of vehicle speeds and accident or casualty rates during the first few months of the 70 m.p.h. trial period, and comparisons with conditions in the corresponding periods of earlier years, the indications are that both on motorways and on ordinary roads conditions during the trial period were safer than before. Further work is necessary, on data covering a longer period than that studied here, to establish the full validity of these indications.

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APPENDIX

ESTIMATION OF NUMBERS OF CASUALTIES AND ACCIDENTS THAT WOULD HAVE OCCURRED IF THE 70 M.P.H. SPEED LIMIT HAD NOT BEEN IN FORCE

The purpose of this Appendix is to describe progress so far made towards reliably estimating the numbers of casualties and accidents that would have been expected in the 70 m.p.h. speed limit trial period if the limit had not been in force. Attention has so far been confined to numbers of casualties, because the saving in casualties gives the best indication of the effectiveness of the speed limit as a safety measure.

The basis of all the methods tried has been to relate the incidence of casualties in corresponding periods in recent years to chosen variables measuring weather conditions and amounts and type of traffic. When a relationship has been found to explain enough of the variation in past years, it can be used, with the values taken by the chosen variables in the speed limit trial period, to estimate the numbers of casualties that would have been expected in the trial period if the limit had not been in force.

Sources of data

Numbers of casualties, details of types of vehicles involved in accidents and road surface conditions at the accident sites were obtained from the Ministry of Transport and Scottish Development Department Forms Stats 19 and 19A. Measurements of the amount of traffic using the roads were obtained from the Laboratory's continuous 50-point traffic census. The Meteorological Office made available records of weather observations at 25 stations in England and Wales.

Casualty rates

The effect on the number of casualties of variations in the amount of traffic on the roads may be taken into account to some extent by considering, instead of the number of casualties, the casualty rate per million vehicle-miles. Estimates of such rates are given for four classes of road for January, February and March 1960–66 in Tables 11 and 12. It can be seen from these tables that on each class of road the casualty rate varies between months and between years, so that a difference between the 1966 rate and, say, the 1965 rate cannot immediately be attributed to the 70 m.p.h. speed limit. The next step in isolating the effect of the speed limit was therefore to find out how much of the past variation in the casualty rate could be explained by other factors, such as changes in weather, traffic composition, etc.

Allowance for weather

Information about weather conditions was available from two sources: reports from Meteorological Office stations and reports on the conditions of the road surface at sites of accidents. The latter has the advantage of referring to conditions on the roads themselves; the former, however, becomes available sooner. By choosing weather stations which report weekly, weather data for one month could be obtained by the second week of the following month, whereas because of the large number of accident reports, tabulations of road casualties according to the road surface conditions at the time of the accidents are available only late in the following month, and then only by special arrangement.

Analysis based on Meteorological Office data

In the earliest stages of the investigation emphasis was placed on obtaining results for the first part of the initial four-month trial period quickly, to help in deciding whether to extend the limit after April 13, 1966. The first analysis therefore covered the month of January, and was based on weather data obtained from Meteorological Office station reports. Choice of stations was restricted to weekly reporting stations for which records were readily available for January 1962–65*; 25 such stations, distributed widely over England and Wales, were chosen. The analysis was also restricted to the fatal and serious casualty rates (Table 11) because the slight casualty rates were not then available.

The period December 30 to February 2 was divided into five seven-day periods, and for each of the resulting 20 seven-day periods covering January 1962–65 the following variables were calculated:—

w = sum of rainfalls recorded at the 25 stations in the 7-day periods;

t = sum of daily maximum and minimum temperatures at the 25 stations in the 7-day period;

s = sum of numbers of hours of sunshine recorded at the 25 stations in the 7-day period.

A fourth variable y was defined as the calendar year of each January. For each class of road the linear regression of the casualty rate on w, t, s, and y was calculated, y being included to take account of any long-term trend there might be in the casualty rate. The proportion of the variation in casualty rate that is explained by a regression relation is measured by R^2, the square of the multiple correlation coefficient. Because of the chance element in the occurrence of accidents the proportion of variation explained in this way would not be expected to exceed 0·9. The values of R^2 obtained in the above analysis are given in Table A.1.

TABLE A.1

Proportions of variation in the casualty rate on each class of road explained by regression of casualty rates on w, t, s and y

Class of road	Values of R^2
Roads with 30 or 40 m.p.h. speed limit	
Trunk and Class I	0·74
Others	0·36
Roads now having 50 or 70 m.p.h. speed limit ..	
Trunk and Class I	0·15
Others	0·39

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* Use of weather data for earlier years would have necessitated calling in records on loan in various parts of the country, with consequent delay.

Only for Trunk and Class I roads with 30 or 40 m.p.h. speed limits was more than half the variation explained; the proportion explained was lowest, less than one sixth, for Trunk and Class I roads now having 50 or 70 m.p.h. speed limits. These roads are, of course, those on which high speeds are more often possible. However, when the differences between the actual rates and their regression estimates were calculated, the differences in adjacent seven-day periods were found to be negatively correlated, and the regression estimates of numbers of casualties in the whole months of January 1962–65 thus agreed well with the actual numbers. This being so, and the values of w, t, s and y in the seven-day periods covering January 1966 being generally well within the range of values observed in the corresponding periods of 1962–65, provisional estimates of expected casualties in January 1966 were calculated from the regression relations. These estimates were intended for use until a more satisfactory method could be developed, but in view of the results subsequently obtained for February, little reliance can now be placed on them.

The same method was applied to February data and for three of the four classes of road the proportions of variation which it explained were rather higher in February than in January. However, the regression analyses were this time based on only 16 seven-day periods instead of 20 (because February has only 4 weeks). Furthermore, February 1966 was very wet and values of w in three of the four seven-day periods covering that month were far outside the range of values for earlier Februarys on which the regression relation was based. For these reasons, reliable estimates for February could not be expected; the resulting figures were clearly too high in relation to those for January, and were in any case subject to very large standard errors. At this stage, in search of a more reliable method, attention was transferred to analysis based on reports of the condition of the road surface at the sites of accidents.

Analysis based on the condition of the road surface at accident sites

On the Ministry of Transport accident report forms Stats 19 and 19A the road surface condition at the time of the accident is described as "dry", "wet" or "snow and ice". Suppose that in a given period the roads of a particular class have three casualty rates r_d, r_w and r_i per million vehicle-miles according as they are dry, wet or icy. Let the traffic passing along the roads in these three conditions be t_d, t_w and t_i million vehicle-miles, and let the numbers of casualties in accidents in which the roads are dry, wet or icy be c_d, c_w and c_i respectively. Let $c = c_d + c_w + c_i$ and let the overall casualty rate for the period on this class of road be r.

Then $c_d = t_d r_d, \quad c_w = t_w r_w, \quad c_i = t_i r_i,$

and

$$r = \frac{c}{t_d + t_w + t_i}$$

$$= \frac{c r_d}{c_d + \dfrac{r_d}{r_w} c_w + \dfrac{r_d}{r_i} c_i}$$

$$\approx \frac{r_d}{1 - \frac{c_w}{c}\left(1 - \frac{r_d}{r_w}\right) - \frac{c_i}{c}\left(1 - \frac{r_d}{r_i}\right)}$$

$$= r_d \sum_{n=0}^{\infty} \left[\frac{c_w}{c}\left(1 - \frac{r_d}{r_w}\right) + \frac{c_i}{c}\left(1 - \frac{r_d}{r_i}\right)\right]^n \quad . \quad . \quad . \quad . \quad . \quad (1)$$

(Since the term in square brackets will normally be less than unity). Thus, on the above model, r is expressible as a power series in the two variables $\frac{c_w}{c}$ and $\frac{c_i}{c}$, and it is appropriate to use these two variables, which will be denoted by W and I respectively, as measures of weather conditions. At first only the linear terms in expression (1) were used but the quadratic terms were included later.

Extension of the above discussion shows that it is appropriate to take into account two other variables: the proportion, N, of traffic passing in the hours of darkness, and the calendar year Y. These variables take into account the difference between casualty rates in daylight and darkness and any long-term trend in the casualty rate.

The period from December 30th to April 6th (April 5th in leap year) was divided into 14 seven-day periods so that the years 1960–65 provided 84 such seven-day periods, for each of which I, N, W, and Y were calculated for each class of road. Regressions of casualty rates on I, N, W and Y were then calculated, i.e. neglecting second and higher order terms in expression (1). Separate regressions were calculated for the three sets of seven-day periods covering January, February and March, and it was found that the values of the coefficients were sufficiently consistent for a single regression relation to be used for each class of road. The values of R^2 obtained by this method are given in Table A.2.

TABLE A.2

Proportions of variation in the casualty rates explained by regression of casualty rates on I, N, W and Y

Class of road	Value of R^2
Roads with 30 or 40 m.p.h. speed limit	
Trunk and Class I	0·73
Others	0·37
Roads now having 50 or 70 m.ph. speed limit	
Trunk and Class I	0·51
Others	0·50

Comparison of Tables A.1 and A.2 shows that for roads now having 50 or 70 m.p.h. limits the proportions of variation explained were higher than by the method based on Meteorological Office data, whilst for roads with 30 or 40 m.p.h. limits the proportions were similar.

When the regression estimates of casualty rates were used to calculate expected numbers of casualties in January, February and March 1960–65 the agreement with actual numbers was found to be good for January, and fairly good for February. In March, however, the agreement was unsatisfactory, particularly in 1965.

In recent years, except for 1963 when the winter was exceptionally severe, the numbers of fatal and serious casualties on Trunk and Class I roads with 30 or 40 m.p.h. speed limits has been about the same in March as in January, as shown in Table 9, but the 1966 estimate for March by this method is six per cent lower than for January. Again, on Trunk and Class I roads now having 50 or 70 m.p.h. limits, the estimate for March 1966 is nine per cent less than for January, whereas Table 9 shows that only once between 1960 and 1965 was the March figure lower than January's.

These discrepancies, taken with the poor agreement for March figures in earlier years, led to the conclusion that the method was not yet reliable. The next step was to include as variables in the regression the second order terms in expression (1) (i.e. I^2, W^2 and IW), which had so far been ignored, but the resulting increases in the proportions of variation explained were small. When variables with ill-determined regression coefficients were excluded the proportions were almost the same as in Table A.2 and the estimates of casualties in January, February, and March 1966 were little changed.

The fact that the variations in earlier years in the January and February casualty figures were better explained than that in the March figures suggested that some seasonal change remained unaccounted for. The results of manual traffic counts at the 50-point census sites suggest that the proportion of traffic consisting of two-wheeled vehicles shows some seasonal variation and, since it is known that two-wheeled vehicles have a higher casualty rate per mile than other vehicles, it was decided to try to take into account variations in the proportion of traffic consisting of two-wheelers. In order to do this the proportion T of casualties that occurred in accidents involving two-wheeled vehicles, together with T^2, IT and WT, were introduced as additional variables in the regression analysis. At the same time the vehicle-mileage, V, was also introduced as a variable, to take account of theoretical considerations suggesting that total casualties may be not simply proportional to vehicle-mileage, but in part proportional to the square of the vehicle-mileage. There has not yet been time to assess fully the results obtained by this latest method, but the values of R^2 (excluding variables with ill-determined regression coefficients) are given in Table A.3.

Comparison of Tables A.2 and A.3 shows that for each class of road the proportion of variation explained by the latest method is somewhat higher, and work is in hand on comparing the regression estimates derived from it for earlier years with the actual values. It should be noted, however, that the proportions of the variation explained by these successive methods are increasing for each class of road, which suggests that the research is on the right lines and might well eventually lead to an acceptable regression relation.

TABLE A.3

Proportions of variation in the casualty rate explained by regression of casualty rates on I, N, T, V, W and Y

Class of road	Value of R^2
Roads with 30 or 40 m.p.h. speed limit	
Trunk and Class I roads	0·78
Other roads	0·45
Roads now having 50 or 70 m.p.h. speed limit	
Trunk and Class I roads	0·57
Other roads	0·53

TABLE 1

Speeds of cars at five sites before and shortly after introduction of speed limit

	Per cent over 70 m.p.h.			Per cent over 80 m.p.h.			Mean speed (m.p.h.)			Standard deviation of speed (m.p.h.)		
	Before*	After†	After/Before	Before*	After†	After/Before	Before*	After†	Change	Before*	After†	After/Before
M.1 dual 3-lane												
Daylight	30	12	0·4	8	1	0·1	65·2	61·1	−4·1	10·7	8·2	0·8
M.4 dual 3-lane												
Daylight	25	12	0·5	8	2	0·25	62·8	60·9	−1·9	12·1	8·8	0·7
Darkness‡	29	17	0·6	9	2½	0·4	63·8	60·8	−3·0	12·2	10·7	0·9
M.4 dual 2-lane												
Daylight	32	6	0·2	9	½	0·05	64·7	58·8	−5·9	11·6	8·4	0·7
A.1 dual 2-lane												
Daylight	14	6	0·4	2½	½	0·2	59·2	57·5	−1·7	10·0	8·5	0·8
Darkness‡	9	7	0·8	2	1	0·5	56·8	55·3	−1·5	9·8	9·6	1·0
A.412 3-lane												
Daylight	3	1	0·3	0	0	—	49·9	47·7	−2·2	8·8	7·9	0·9
Average in daylight (5 sites)			0·35			0·15			−3·2			0·8
Average in darkness‡ (2 sites)			0·7			0·45			−2·2			0·95
Average, daylight and darkness combined			0·45			0·25			−2·9			0·85

* Mid-December 1965

† Mid-January to mid-February 1966

‡ Includes light goods vehicles

TABLE 2

Traffic flows and sample sizes relating to the results in Table 1

	Traffic flow in direction of speed measurements (all classes of vehicle per hour)		Numbers of cars whose speeds were measured	
	Before	After	Before	After
M.1 dual 3-lane				
Daylight	740	690	2,178	1,895
M.4 dual 3-lane				
Daylight	990	860	1,723	1,450
Darkness	890	840	1,607	1,444
M.4 dual 2-lane				
Daylight	960	810	1,930	1,501
A.1 dual 3-lane				
Daylight	340	330	896	881
Darkness	140	120	259	191
A.412 3-lane				
Daylight	360	340	1,020	867
TOTAL	—	—	9,613	8,229

TABLE 3

Percentages of cars travelling at different speeds on motorways (average for M.1 and two sites on M.4) before and after introduction of the 70 m.p.h. speed limit

	Before*		After†		Change	
Under 40 m.p.h. ..	1	37	1	45	0	+8
40–45 m.p.h... ..	3		4		+1	
45–50 m.p.h. ..	6		7		+1	
50–55 m.p.h... ..	10		13		+3	
55–60 m.p.h... ..	17		20		+3	
60–65 m.p.h... ..	18	34	26	45	+8	+11
65–70 m.p.h... ..	16		19		+3	
70–75 m.p.h... ..	12	29	7	10	−5	−19
75–80 m.p.h... ..	9		2		−7	
80–85 m.p.h... ..	4		1		−3	
85–90 m.p.h... ..	2		0		−2	
Over 90 m.p.h. ..	2		0		−2	
TOTAL	100		100		0	
Number of car speeds measured	5,831		4,846		−985	

* Mid-December 1965.

† Mid-January to mid-February 1966

TABLE 4

Speeds of vehicles* in the third (outer) lane of M.1, before and shortly after introduction of 70 m.p.h. speed limit

	Before (mid-December 1965)	After (Early February 1966)
Per cent over 70 m.p.h.	61	31
Per cent over 75 m.p.h.	37	11
Per cent over 80 m.p.h.	20	3½
Per cent over 85 m.p.h.	10	1
Per cent over 90 m.p.h.	4½	0
Per cent over 95 m.p.h.	2	0
Mean speed (m.p.h.)	73	67
Standard deviation of speeds (m.p.h.) ..	9·4	7·2
Number of speeds measured	785	514
Flow in the third lane (vehicles per hour)	132	87

* 95 per cent were cars.

TABLE 5

Speeds of goods vehicles on M.1. before and shortly after introduction of 70 m.p.h. speed limit

Class of vehicle	Per cent over 60 m.p.h.		Per cent over 70 m.p.h.		Mean speed (m.p.h.)		Standard deviation of speed (m.p.h.)	
	Before*	After†	Before*	After†	Before*	After†	Before*	After†
Light goods	24	20	1·7	0·6	54·5	53·9	7·5	7·5
Medium goods	0·8	0·8	0	0	46·5	45·3	6·1	6·1
Heavy goods	0	0·5	0	0	43·1	42·2	6·4	6·2

* Mid-December 1965.

† February 1966.

Table 6

Trends in speeds of cars on M.1: December, 1965–April, 1966

	Per cent over 70 m.p.h.	Per cent over 80 m.p.h.	Mean speed (m.p.h.)
Mid-December 1965 ..	30	8	65·2
	(Speed limit introduced 22nd December)		
Late December 1965 ..	7½	½	59·4
Early February 1966 ..	12	1	61·1
Mid-March 1966	21	2	63·0
Early April 1966*	14	1½	61·6

* These results may have been affected by road works about 1½ miles in advance of the observation site.

Table 7

Trends in the speed of cars on roads other than M.1: December, 1965–May/June, 1966

	M.4. (dual 3-lane)	M.4. (dual 2-lane)	A.1. (dual 2-lane)		A.412 (3-lane)
	Daylight	Daylight	Daylight	Darkness	Daylight
Per cent over 70 m.p.h. Mid-December 1965	25	32	14	9	3
	(Speed limit introduced 22nd December)				
January/February 1966	12	6	6	7	1
May/June	16	15	10	9	2½
Per cent over 80 m.p.h. Mid-December 1965	8	9	2½	2	0
	(Speed limit introduced 22nd December)				
January/February 1966	2	½	½	1	0
May/June 1966	2½	1½	1	½	½
Mean speed (m.p.h.) Mid-December 1965	62·8	64·7	59·2	56·8	49·9
	(Speed limit introduced 22nd December)				
January/February 1966	60·9	58·8	57·5	55·3	47·7
May/June 1966..	60·7	61·0	57·7	55·2	49·4

TABLE 8

Use of the third lane on M.1 (December, 1965–April, 1966)

	Per cent of all cars which used the third lane	
	Actual	Adjusted*
Mid-December 1965..	35	35
(Speed limit introduced 22nd December 1965)		
Late December 1965..	28	29
Early February 1966..	26	27
Mid-March 1966	31	30
Early April 1966	32	30

*Adjusted to allow for variations in traffic flow (on the carriageway as a whole) from one set of measurements to another; based on known relations between the proportion of vehicles in the third lane and the traffic on the whole carriageway (see *Road Research 1963*, page 17(31)).

TABLE 9

Fatal and serious casualties in Great Britain (excluding motorways)

	1960	1961	1962	1963	1964	1965	1966
Roads with 30 or 40 m.p.h. limit:							
Trunk and Class I:							
January	2,309	2,368	2,292	1,845	2,514	2,746	2,602
February	2,057	2,099	1,995	1,627	2,378	2,291	2,470
March	2,273	2,358	2,189	2,416	2,547	2,726	2,688
January–March ..	6,639	6,825	6,476	5,888	7,439	7,763	7,760
Other roads:							
January	1,826	1,986	1,971	1,441	2,289	2,401	2,325
February	1,711	1,809	1,848	1,369	2,167	2,088	2,291
March	1,912	2,279	2,082	2,054	2,323	2,837	2,710
January–March ..	5,449	6,074	5,901	4,864	6,779	7,326	7,326
Roads with 50 or 70 m.p.h. limit in 1966:							
Trunk and Class I:							
January	1,353	1,465	1,480	1,329	1,684	1,964	1,636
February	1,283	1,240	1,248	1,407	1,564	1,488	1,569
March	1,396	1,507	1,333	1,447	1,762	1,962	1,841
January–March ..	4,032	4,212	4,061	4,183	5,010	5,414	5,046
Other roads:							
January	517	566	641	597	705	780	810
February	578	598	585	692	701	650	691
March	571	765	712	577	807	852	844
January–March ..	1,666	1,929	1,938	1,866	2,213	2,282	2,345

TABLE 10

Slight casualties in Great Britain (excluding motorways)

	1960	1961	1962	1963	1964	1965	1966
Roads with 30 or 40 m.p.h. limit:							
Trunk and Class I:							
January	7,046	7,285	7,064	6,094	7,677	8,477	7,784
February	6,877	6,440	6,605	5,683	7,223	7,164	7,875
March	7,197	7,692	7,429	7,415	8,133	9,028	8,348
January–March ..	21,120	21,417	21,098	19,192	23,033	24,669	24,007
Other roads:							
January	5,858	6,366	6,298	5,215	6,880	8,102	7,347
February	6,023	5,926	5,966	5,183	6,581	6,931	7,167
March	6,731	7,393	6,780	6,793	7,583	8,950	8,689
January–March ..	18,612	19,685	19,044	17,191	21,044	23,983	23,203
Roads with 50 or 70 m.p.h. limit in 1966:							
Trunk and Class I:							
January	2,511	2,775	2,690	2,586	2,780	3,135	2,835
February	2,473	2,184	2,096	2,650	2,550	2,491	2,592
March	2,194	2,616	2,420	2,474	3,105	3,236	2,821
January–March ..	7,178	7,575	7,206	7,710	8,435	8,862	8,248
Other roads:							
January	1,208	1,186	1,351	1,752	1,449	1,468	1,575
February	1,131	1,117	1,161	1,969	1,317	1,214	1,448
March	1,106	1,329	1,204	1,102	1,510	1,694	1,401
January–March ..	3,445	3,632	3,716	4,823	4,276	4,376	4,424

TABLE 11

Indices* of fatal and serious casualty rates in Great Britain (excluding motorways)

	1960	1961	1962	1963	1964	1965	1966
Roads with 30 or 40 m.p.h. limit:							
Trunk and Class I:							
January	1·58	1·34	1·24	1·00	1·13	1·15	1·05
February	1·30	1·21	1·12	0·95	1·08	1·00	1·03
March	1·25	1·18	1·08	1·11	1·05	1·07	0·95
January–March	1·36	1·24	1·14	1·03	1·08	1·08	1·01
Other roads:							
January	1·54	1·53	1·43	1·27	1·42	1·37	1·28
February	1·46	1·40	1·40	1·21	1·33	1·24	1·28
March	1·44	1·53	1·39	1·35	1·35	1·49	1·28
January–March	1·48	1·49	1·40	1·28	1·36	1·37	1·28
Roads with 50 or 70 m.p.h. limit in 1966:							
Trunk and Class I:							
January	0·92	0·89	0·81	0·83	0·85	0·89	0·70
February	0·85	0·75	0·72	0·87	0·76	0·67	0·69
March	0·76	0·74	0·66	0·66	0·73	0·77	0·66
January–March	0·84	0·79	0·73	0·77	0·78	0·78	0·68
Other roads:							
January	0·98	0·95	1·00	1·24	0·91	0·96	0·95
February	1·05	1·00	0·94	1·46	0·91	0·80	0·84
March	0·87	1·00	0·98	0·74	0·88	0·88	0·78
January–March	0·96	0·98	0·97	1·08	0·91	0·88	0·85

* The figures in the Table are described as indices of fatal and serious casualty rates because, owing to the classification of roads in the 50-point traffic census, they are only approximations to the ratios:

$$\frac{\text{Number of casualties on roads in the class}}{\text{Estimated vehicle-mileage travelled on roads in the class (millions)}}.$$

Estimated vehicle-mileages on roads in urban districts and boroughs in England and Wales and small and large burghs in Scotland were used as the best available measure of vehicle-mileages on roads with 30 or 40 m.p.h. limits; vehicle-mileages on roads in other local authority areas were used as the best measure of those on roads which had 50 or 70 m.p.h. limits in 1966.

TABLE 12

Indices* of slight casualty rates in Great Britain (excluding motorways)

	1960	1961	1962	1963	1964	1965	1966
Roads with 30 or 40 m.p.h. limit:							
Trunk and Class I:							
January	4·82	4·12	3·82	3·31	3·45	3·56	3·14
February	4·35	3·72	3·71	3·31	3·28	3·13	3·29
March	3·94	3·85	3·65	3·39	3·34	3·55	2·95
January–March	4·34	3·90	3·73	3·34	3·36	3·42	3·12
Other roads:							
January	4·96	4·90	4·55	4·60	4·28	4·62	4·04
February	5·13	4·60	4·53	4·57	4·03	4·12	4·00
March	5·07	4·95	4·51	4·46	4·40	4·70	4·12
January–March ..	5·05	4·82	4·53	4·54	4·24	4·49	4·06
Roads with 50 or 70 m.p.h. limit in 1966:							
Trunk and Class I:							
January	1·70	1·69	1·48	1·61	1·40	1·43	1·21
February	1·64	1·32	1·21	1·64	1·24	1·13	1·14
March	1·20	1·28	1·20	1·13	1·28	1·27	1·00
January–March ..	1·49	1·42	1·29	1·43	1·31	1·28	1·11
Other roads:							
January	2·29	1·98	2·12	3·62	1·89	1·81	1·85
February	2·05	1·87	1·85	4·13	1·72	1·50	1·76
March	1·70	1·73	1·65	1·42	1·65	1·75	1·29
January–March ..	1·99	1·85	1·87	2·78	1·75	1·69	1·60

* See footnote to Table 11.

TABLE 13

Casualties in Great Britain, January to March inclusive (excluding motorways)

Percentage of total casualties which were fatal or serious

	Roads with 30 or 40 m.p.h. limit		Roads with 50 or 70 m.p.h. limit in 1966	
	Trunk and Class I	Other roads	Trunk and Class I	Other roads
1960	24	23	36	33
1961	24	24	36	35
1962	23	24	36	34
1963	23	22	35	28
1964	24	24	37	34
1965	24	23	38	34
1966	24	24	38	35

TABLE 14

Car driver casualties in Great Britain, January to March inclusive (excluding motorways)

Percentage of total casualties which were fatal or serious

	Roads with 30 or 40 m.p.h. limit		Roads with 50 or 70 m.p.h. limit in 1966	
	Trunk and Class I	Other roads	Trunk and Class I	Other roads
1960	21	16	34	25
1961	21	18	34	29
1962	20	18	34	29
1963	20	16	35	25
1964	21	17	37	31
1965	19	17	38	31
1966	20	18	38	33

TABLE 15

Injury accidents involving 3 or more vehicles, as a percentage of the total in Great Britain—January to March inclusive

	1960	1961	1962	1963	1964	1965	1966
Roads with 30 or 40 m.p.h. limit:							
Trunk and Class I:							
Fatal and serious	4·3	4·9	4·8	4·8	5·3	5·4	5·5
Slight	5·4	5·1	5·5	5·7	6·5	6·7	5·3
Other roads:							
Fatal and serious	2·8	2·8	2·9	3·1	3·4	4·1	3·4
Slight	2·8	2·9	3·2	3·9	3·6	4·2	3·1
Roads with 50 or 70 m.p.h. limit in 1966:							
Trunk and Class I:							
Fatal and serious	9·0	9·1	10·1	11·4	11·5	11·4	10·5
Slight	8·5	9·1	9·0	10·4	10·8	10·4	10·1
Other roads:							
Fatal and serious	3·7	2·8	3·4	2·5	3·8	4·2	4·3
Slight	3·0	2·9	2·9	2·7	2·5	4·1	3·1

TABLE 16

Injury accidents, casualties and traffic in 3 months (January–March inclusive) on motorways (including those in fog)

Year	Miles in use	Traffic (1964=100)	Injury accidents		Casualties	
			Number	Relative rate (1964=100)	Number	Relative rate (1964=100)
M.1/M.10/M.45						
1964	73	100	101	100	171	100
1965	73	108	79	73	126	68
1966	73	116	63	54	118	59
M.6						
1964	97	100	54	100	90	100
1965		129	51	73	84	73
1966	110	151	53	65	74	55
Other Motorways						
1964	114	100	53	100	75	100
1965		155	67	81	106	91
1966	200	269	101	71	162	80

TABLE 17

Accidents and casualties on 11½ miles of M.4 (Slough and Maidenhead By-passes)—December 22nd (noon) to April 13th inclusive

(i) *Numbers*

	Accidents				Casualties			
	In fog		Not in fog		In fog		Not in fog	
	Injury	Non Injury	Injury	Non Injury	Fatal	Non Fatal	Fatal	Non Fatal
1963–64 ..	1	3	8	11	0	3	1	10
1964–65 ..	2	2	17	21	0	2	0	29
1965–66 ..	1	1	15	9	0	1	7	28

(ii) *Number per million vehicle-miles not in fog*

	Accidents			Casualties (including killed)
	Injury	Non-injury	All accidents	
1963–64	0·34	0·47	0·80	0·47
1964–65	0·56	0·69	1·25	0·95
1965–66	0·36	0·21	0·57	0·83
Percentage change in 1965–66 compared with average for 2 previous years.	−22	−65*	−46*	+11

* Reduction statistically significant at 1 per cent level.

TABLE 18

Accidents and casualties on 73 miles of M.1/M.10/M.45—22nd December (noon) to 30th April inclusive

	Accidents				Casualties			
	In fog		Not in fog		In fog		Not in fog	
	Injury	Non-injury	Injury	Non-injury	Fatal	Non-fatal	Fatal	Non-fatal
1960–61 ..	4	4	68	69	0	8	11	117
1961–62 ..	5	10	92	63	1	10	11	138
1962–63 ..	14	13	80	82	0	27	5	109
1963–64 ..	33	30	95	97	2	76	4	146
1964–65 ..	0	2	113	103	0	0	11	197
1965–66 ..	1	2	92	97	0	1	12	162

TABLE 19

Accidents and casualties per million vehicle-miles on 73 miles of M.1/M.10/M.45 not in fog—22nd December (noon) to 30th April inclusive

	Accidents			Casualties (including killed)
	Injury	Non-injury	All accidents	
1960–61	0·50	0·51	1·01	0·94
1961–62	0·64	0·44	1·08	1·04
1962–63	0·53	0·53	1·06	0·74
1963–64	0·53	0·54	1·07	0·84
1964–65	0·55	0·50	1·05	1·01
1965–66	0·42	0·45	0·87	0·80
Percentage reduction in 1965–6 compared with average for previous 5 years.	23*	11	17*	13

*Reduction statistically significant at 2½ per cent level.

TABLE 20

Casualties on 73 miles of M.1/M.10/M.45 not in fog—22nd December (noon) to 30th April inclusive

	Casualties				Percentage killed or seriously injured
	Killed	Seriously injured	Slightly injured	All casualties	
1960–61	11	57	60	128	53
1961–62	11	46	92	149	38
1962–63	5	40	69	114	39
1963–64	4	82	64	150	57
1964–65	11	79	118	208	43
1965–66	12	81	81	174	53

TABLE 21

Accidents (injury and non-injury) on 73 miles of M.1/M.10/M.45 not in fog in which a vehicle was hit in the rear—January to March, inclusive

Year	Manoeuvre of vehicle that was hit				Relative rate of col.(3) per million vehicle-miles not in fog (5)
	Stationary on hard shoulder (1)	Stationary on carriageway (2)	Moving on carriageway (3)	Not known (4)	
1961 ..	2	5	24	0	100
1962 ..	2	7	28	1	112
1963 ..	6	6	31	0	115
1964 ..	3	3	36	2	112
1965 ..	4	4	43	3	123
1966 ..	4	3	38	1	100

TABLE 22

Accidents (injury and non-injury) apparently caused by tyre failures on 73 miles of main carriageway of M.1/M.10/M.45—January to April, inclusive

	Number of accidents caused by tyre failure	Number per million vehicle-miles
1960	20	0·20
1961	12	0·09
1962	20	0·15
1963	14	0·09
1964	18	0·10
1965	22	0·11
1966	15	0·07

TABLE 23

Skidding in all accidents (injury and non-injury) on 73 miles of M.1/M.10/M.45—January to April, inclusive

	Road dry		Road wet		Road icy	
	Total	Percentage involving skidding	Total	Percentage involving skidding	Total	Percentage involving skidding
1960	90	14	47	30	32	87
1961	73	18	39	46	8	100
1962	72	31	43	44	34	79
1963	66	23	52	46	45	82
1964	109	30	105	43	16	69
1965	102	32	84	50	19	84
1966	92	21	73	48	8	50

TABLE 24

Motorists' views on the effect of the 70 m.p.h. limit on accidents before and after the limit was introduced (Road Research Laboratory Survey)

	Percentages of motorists					
	Motorists who drive a vehicle which can go at over 70 m.p.h.		Motorists who do not drive a vehicle which can go at over 70 m.p.h.		All motorists	
	Before (December 1965)	After (February 1966)	Before (December 1965)	After (February 1966)	Before	After
There will be fewer accidents	37	40	44	44	40	41
There will be the same number of accidents..	53	48	46	44	50	47
There will be more accidents	9	12	9	9	9	11
No answer	1	0	1	3	1	2
Accidents which happen will be less serious than before	41	44	49	43	44	43
Accidents will be as serious as before ..	54	50	44	47	49	49
Accidents will be more serious than before ..	5	5	6	7	5	5
No answer	0	1	1	3	2	2
Number of motorists	201	213	140	131	353	347

Note.—The sub-groups do not add to 353 or 347 in this case, because some motorists did not answer the relevant questions.

TABLE 25

Public opinion on the 70 m.p.h. limit

	Percentages	
	Before (December 1965)	After (February 1966)
	All electors (NOP)	All electors (NOP)
Approve of 70 m.p.h. limit	53	—
Approve of 70 m.p.h. limit on motorways	—	54
Approve of 70 m.p.h. limit on other roads	—	55
Disapprove of 70 m.p.h. limit	41	—
Disapprove of 70 m.p.h. limit on motorways	—	34
Disapprove of 70 m.p.h. limit on other roads	—	36
Don't know	6	*
Number of respondents	2,050	2,127
	All motorists (NOP)	All motorists (NOP)
Approve of 70 m.p.h. limit	60	—
Approve of 70 m.p.h. limit on motorways	—	53
Approve of 70 m.p.h. limit on other roads	—	68
Disapprove of 70 m.p.h. limit	38	—
Disapprove of 70 m.p.h. limit on motorways	—	43
Disapprove of 70 m.p.h. limit on other roads	2	30
Don't know	2	*
Number of respondents	430	484
	All motorists (RRL)	All motorists (RRL)
Thinks trial 70 m.p.h. a good idea ..	78	84
Thinks trial 70 m.p.h. not a good idea..	20	15
Don't know	2	1
Number of respondents	353	347
	All who sometimes drive a vehicle which can go at over 70 m.p.h. (RRL)	All who sometimes drive a vehicle which can go at over 70 m.p.h. (RRL)
Thinks trial 70 m.p.h. a good idea ..	74	83
Thinks trial 70 m.p.h. not a good idea..	24	16
Don't know	2	1
Number of respondents	201	213
	All who sometimes drive on motorways (RRL)	All who sometimes drive on motorways (RRL)
Thinks trial 70 m.p.h. a good idea ..	76	83
Thinks trial 70 m.p.h. not a good idea..	23	16
Don't know	1	1
Number of respondents	262	243
	All who sometimes drive a vehicle which can go at over 70 m.p.h. and who drive on a motorway and/or on a road where people drive at speeds of over 70 m.p.h. (RRL)	All who sometimes drive a vehicle which can go at over 70 m.p.h. and who drive on a motorway and/or on a road where people used to drive at speeds of over 70 m.p.h. (RRL)
Thinks trial 70 m.p.h. a good idea ..	74	84
Thinks trial 70 m.p.h. not a good idea..	24	15
Don't know	2	1
Number of respondents	196	207

* The proportion of respondents who "do not know" was different for the question referring to motorways and the question referring to "other roads".

TABLE 26

Comments by 18 police forces on the apparent effect of the 70 m.p.h. speed limit on motorways. (December 22, 1965 to April 13, 1966, inclusive)

	Increased or more frequent	No evidence of increase or decrease	Decreased or less frequent
Bunching:			
2-lane	2	12	0
3-lane	2	7	0
Lane changing:			
2-lane	2	12	0
3-lane	1	6	2
Tailing:			
2-lane	2	12	0
3-lane	1	8	0
Drowsiness	0	18	0
Vehicle breakdowns	0	16	2
Confidence and security	10	7	1

General comment on overall effect

Useful, successful, limit observed, driving satisfactory, etc.	9
No change in driving behaviour	4
No comment on overall effect	5
Adverse comment on overall effect	0
	18

Notes.—For this purpose " bunching " was defined as 4 or more vehicles travelling close together in the outer lane at or near 70 m.p.h. " Tailing " was to be regarded as the tendency for a faster vehicle to have to follow closely behind a vehicle in the outer lane because a driver is keeping strictly within the limit and refusing to move back to the inner lane to let others pass.

15 AU
1966
CAMBRIDGE

(94341) Dd. 126871 K. 40 7/66 Hw.